GEORGIA'S K-12 MATHEMATICS STANDARDS 2021

Governor Kemp and Superintendent Woods are committed to the best set of academic standards for Georgia's students – laying a strong foundation of the fundamentals, ensuring age- and developmentally appropriate concepts and content, providing instructional supports to set our teachers up for success, protecting and affirming local control and flexibility regarding the use of mathematical strategies and methods, and preparing students for life. These Georgia-owned and Georgia-grown standards leverage the insight, expertise, experience, and efforts of thousands of Georgians to deliver the very best educational experience for Georgia's 1.7 million students.

In August 2019, Governor Brian Kemp and State School Superintendent Richard Woods announced the review and revision of Georgia's K-12 mathematics standards. Georgians have been engaged throughout the standards review and revision process through public surveys and working groups. In addition to educator working groups, surveys, and the Academic Review Committee, Governor Kemp announced a new way for Georgians to provide input on the standards: the Citizens Review Committee, a group composed of students, parents, business and community leaders, and concerned citizens from across the state. Together, these efforts were undertaken to ensure Georgians will have buy-in and faith in the process and product.

The Citizens Review Committee provided a charge and recommendations to the working groups of educators who came together to craft the standards, ensuring the result would be usable and friendly for parents and students in addition to educators. More than 14,000 Georgians participated in the state's public survey from July through September 2019, providing additional feedback for educators to review. The process of writing the standards involved more than 200 mathematics educators -- from beginning to veteran teachers, representing rural, suburban, and metro areas of our state.

Grade-level teams of mathematics teachers engaged in deep discussions; analyzed stakeholder feedback; reviewed every single standard, concept, and skill; and provided draft recommendations. To support fellow mathematics teachers, they also developed learning progressions to show when key concepts were introduced and how they progressed across grade levels, provided examples, and defined age/developmentally appropriate expectations.

These teachers reinforced that strategies and methods for solving mathematical problems are classroom decisions -- not state decisions -- and should be made with the best interest of the individual child in mind. These recommended revisions have been shared with the Academic Review Committee, which is composed of postsecondary partners, age/development experts, and business leaders, as well as the Citizens Review Committee, for final input and feedback.

Based on the recommendation of Superintendent Woods, the State Board of Education will vote to post the draft K-12 mathematics standards for public comment. Following public comment, the standards will be recommended for adoption, followed by a year of teacher training and professional learning prior to implementation.

Use of Mathematical Strategies and Methods & Affirming Local Control

These standards preserve and affirm local control and flexibility regarding the use of the "standard algorithm" and other mathematical strategies and methods. Students have the right to use any strategy that produces accurate computations, makes sense, and is appropriate for their level of understanding.

Therefore, the wording of these standards allows for the "standard algorithm" as well as other cognitive strategies deemed developmentally appropriate for each grade level. Revised state tests will not measure the students' use of specific mathematical strategies and methods, only whether students understand the key mathematical skills and concepts in these standards.

Teachers are afforded the flexibility to support the individual needs of their students. It is critical that teachers and parents remain partners to help each child grow to become a mathematically literate citizen.

Georgia's K-12 Mathematics Standards - 2021
Mathematics Big Ideas and Learning Progressions, K-5

Mathematics Big Ideas, K-5

K	1	2	3	4	5
MATHEMATICAL PRACTICES & MODELING					
DATA & STATISTICAL REASONING					
NUMERICAL REASONING (NR)					
PATTERNING & ALGEBRAIC REASONING (PAR)					
GEOMETRIC & SPATIAL REASONING (GSR)					
MEASUREMENT & DATA REASONING (MDR)					

K-5 MATHEMATICS: LEARNING PROGRESSIONS

Key Concepts	K	1	2	3	4	5
NUMERICAL REASONING						
Numbers (whole numbers, fractions, and decimal numbers)	• Whole numbers to 100	• Whole numbers to 120 • Partition shapes into halves and quarters/fourths (fourths) with no shading	• Whole numbers to 1000 • Partition shapes into halves, thirds and quarters (fourths) with no shading	• Whole numbers to 10,000 • Unit fractions with denominators of 2, 3, 4, 6, and 8 • Represent fractions • Equivalence of simple fractions • Introduce shading to identify and compare fractional parts	• Whole numbers to 100,000 • Non-unit fractions with denominators of 2, 3, 4, 5, 6, 8, 10, 12, and 100 • Fractions with like denominators • Decimal fractions (tenths and hundredths)	• Multi-digit whole numbers • Fractions with unlike denominators • Fractions greater than 1 • Decimal fractions to thousandths
Counting	• Counting forward to 100 • Counting backward from 20 • Counting objects to 20	• Counting forward and backward within 120 • Skip counting by 2s, 5s, and 10s • Counting objects to 120	• Counting forward and backward within 1000 • Skip counting by 2s, 5s, 10s, 25s, and 100s • Counting objects to 1000	• Counting unit fractions	• Counting non-unit fractions	• Counting decimal numbers
Place Value	• Compose and decompose numbers within 20 • Identify and write numerals to 20	• Compose and decompose 2-digit numbers	• Hundreds, tens and ones in 3-digit numbers	• Round numbers to 1000 to nearest 10 or 100 • Read & write multi-digit whole numbers to thousands	• Magnitude of place value • Multi-digit whole numbers to 100,000 • Round multi-digit whole numbers • Fractions with • denominators of 10 or 100	• Magnitude of place value extended to decimal numbers • Powers of 10 to 10^3 • Read & write decimal numbers to thousandths place • Round decimal numbers to hundredths place
Comparisons	• Comparing objects up to 10 • Comparing numbers of objects in a set from 1-10	• Comparing numbers to 100	• Comparing numbers to 1,000	• Comparing numbers to 10,000 • Unit fractions	• Multi-digit numbers • Fractions less than 1 • Decimal fractions to hundredths place	• Decimal fractions to thousandths place • Fractions greater than 1
Computational Fluency	• Fluency with addition and subtraction within 5	• Fluency with addition and subtraction within 10	• Fluency using mental math up to 20 • Fluency with strategies within 100	• Fluency with multiplication and division with single-digit numbers • Fluency with addition and subtraction within 1,000	• Fluency with addition and subtraction with multi-digit whole numbers	• Fluency with multiplication and division with multi-digit whole numbers
Addition & Subtraction	• Single-digit numbers within 10	• Within 20 (using properties of operations) • Within 100 (using base ten understanding)	• Within 1,000 (using tools and strategies)	• Within 10,000	• Within 100,000 • Fractions with like denominators	• Fractions with unlike denominators • Decimal fractions to the hundredths place
Multiplication & Division			• Building arrays	• Within 100 • Multiply by multiples of 10	• Factors and multiples • Prime and composite numbers • Multiply by multi-digit whole numbers • Divide by 1-digit divisors	• Multiply multi-digit whole numbers • Multiply fractions and whole numbers • Divide unit fractions and whole numbers • Reason about multiplying by a fraction >, <, or = 1
Expressions						• Simple numerical expressions involving whole numbers with or without grouping symbols • Express fractions as division problems

K-5 MATHEMATICS: LEARNING PROGRESSIONS

Key Concepts	K	1	2	3	4	5
PATTERNING & ALGEBRAIC REASONING						
Patterns	• Repeating patterns with numbers and shapes • Explain the rationale for the pattern.	• Growing and repeating patterns of 1s, 5s, and 10s • Repeated operations, shapes or numbers	• Numerical patterns involving addition and subtraction	• Numerical patterns related to multiplication • Make predictions based on patterns	• Generate number and shape patterns that follow a rule • Represent and describe patterns	• Generate two numerical patterns using a given rule • Identify relationships using a table
Graphing						• Plot order pairs in first quadrant
GEOMETRIC & SPATIAL REASONING						
Shapes and Properties	• Identify, sort, classify, analyze, and compare 2D & 3D based on attributes using informal language • Positional words	• Identify, sort, and classify 2D & 3D shapes based on specific attributes using formal language and geometric properties • Compose 2D shapes & 3D shapes	• Describe, compare and sort 2-D and 3-D shapes given a set of attributes • Identify lines of symmetry in everyday objects	• Quadrilaterals • Parallel & perpendicular line segments, points, lines, line segments, & right angles and presence or absence of these in quadrilaterals • Lines of symmetry with quadrilaterals	• Points, lines, line segments, rays, angles, and parallel & perpendicular line segments • Classify, compare, & contrast polygons based on presence or absence of parallel or perpendicular line segments, angles of a specified size or side lengths.	• Classify polygons based on geometric properties • Relationships between categories and subcategories of shapes
Geometric Measurement				• Area of rectangles • Perimeter of rectangles	• Area and perimeter of composite rectangles • Angle measurement	• Volume of right rectangular prisms
MEASUREMENT & DATA REASONING						
Measurement & Data	• Measurable attributes of length, height, width and weight • Classify and sort up to 10 objects by attributes • Display and interpret categorical data with up to 10 data points on graphs	• Measure length in non-standard units • Compare, describe and order up to 3 objects using length in non-standard units • Display and interpret categorical data (with up to 3 categories)	• Measure length to nearest whole unit • Use tools such as constructed rulers and standard rulers • Choose units (in, ft, yd) appropriately • Display and interpret categorical data (with up to 4 categories)	• Measure liquid volume, length and mass in customary units • Use rulers to measure lengths in halves and fourths of an inch • Analyze numerical and categorical data with whole number values	• Measure liquid volume, distance, and mass using the metric measurement system • Use rulers to measure lengths to nearest $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{8}$ of an inch • Analyze data using dot plots (with values to the nearest 1/8 of a unit)	• Measure length and weight in metric units • Convert between units of measurement • Create and analyze dot plots (line plots) with fraction measurements
Money	• Identify pennies, nickels and dimes and know the value of each coin	• Identify value of pennies, nickels, dimes and quarters	• Combination of coins • Problems involving dollars and all coins	• Using money to solve problems	• Using money as a tool or manipulative to solve problems	• Using money as a tool to solve problems involving decimals
Time		• Tell & write time in hours and half hours • Measure elapsed time to the hour	• Time to the nearest five minutes • Distinguish between a.m. & p.m. • Elapsed time to hour or half hour	• Tell time to the nearest minute • Estimate relative time • Elapsed time to hour, half hour & quarter hour	• Intervals of time • Elapsed time to the nearest minute	• Solving problems involving time

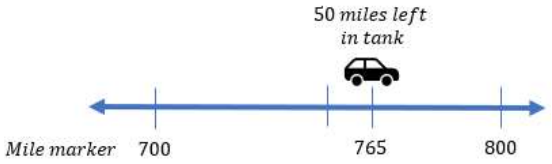
3rd Grade

The nine standards listed below are the key content competencies students will be expected to master in third grade. Additional clarity and details are provided through the classroom-level learning objectives and evidence of student learning details for each grade-level standard found on subsequent pages of this document. As teachers are planning instruction and assessing mastery of the content at the grade level, the focus should remain on the key competencies listed in the table below.

THIRD GRADE STANDARDS
3.MP: **Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals.**
3.NR.1: **Use place value reasoning to represent, read, write, and compare numerical values up to 10,000 and round whole numbers up to 1,000.**
3.PAR.2: **Use part-whole strategies to represent and solve real-life problems involving addition and subtraction with whole numbers up to 10,000.**
3.PAR.3: **Use part-whole strategies to solve real-life, mathematical problems involving multiplication and division with whole numbers within 100.**
3.NR.4: **Represent fractions with denominators of 2, 3, 4, 6 and 8 in multiple ways within a framework using visual models.**
3.MDR.5: **Solve real-life, mathematical problems involving length, liquid volume, mass, and time and analyze graphical displays of data to answer relevant questions.**
3.GSR.6: **Identify the attributes of polygons, including parallel segments, perpendicular segments, right angles, and symmetry.**
3.GSR.7: **Identify area as a measurable attribute of rectangles and determine the area of a rectangle presented in real-life, mathematical problems.**
3.GSR.8: **Determine the perimeter of a polygon presented in real-life, mathematical problems.**

Georgia's K-12 Mathematics Standards – 2021

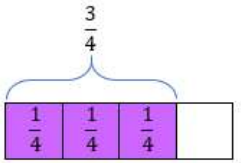
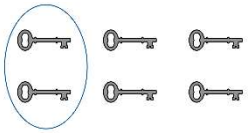
3rd Grade

<table>
<tr><td colspan="6">NUMERICAL REASONING – base ten numerals and place value up to 10,000, and rounding up to 1,000</td></tr>
<tr><td colspan="6">3.NR.1: Use place value reasoning to represent, read, write, and compare numerical values up to 10,000 and round whole numbers up to 1,000.</td></tr>
<tr><td colspan="2">Expectations</td><td colspan="4">Evidence of Student Learning
(not all inclusive; see Grade Level Overview for more details)</td></tr>
<tr><td>3.NR.1.1</td><td>Read and write multi-digit whole numbers up to 10,000 using base-ten numerals and expanded form.</td><td colspan="2">Strategies and Methods
● Students should be able to compose (combine) and decompose (break apart) numbers in various ways.
● Examples of different strategies and representations can be found within the Computational Strategies for Whole Numbers document found in the appendices.</td><td colspan="2">Examples
● 15 tens + 13 ones = 163 OR 16 tens + 3 ones
● 568 = 500 + 50 + 18 OR 500 + 60 + 8</td></tr>
<tr><td>3.NR.1.2</td><td>Use place value reasoning to compare multi-digit numbers up to 10,000, using >, =, and < symbols to record the results of comparisons.</td><td colspan="4">Strategies and Methods
● Students should be able to compare whole numbers up to 10,000.
● Students should also create bar graphs and dot plots to represent numerical data when answering a statistical investigative question. They should be able to analyze the data presented in dot plots and bar graphs to compare multi-digit numbers using the symbols to record comparison in context.</td></tr>
<tr><td>3.NR.1.3</td><td>Use place value understanding to round whole numbers up to 1000 to the nearest 10 or 100.</td><td>Relevance and Application
● Students should be able to use place value understanding to round whole numbers for an authentic purpose within authentic situations.</td><td>Strategies and Methods
● Students should locate numbers on a number line to determine the nearest multiple of 10 or 100.</td><td>Fundamentals
● Students should be given opportunities to build understanding by exploring the concept within 100 first and then progressing to applying the same mathematical thinking within 1000.</td><td>Example
● On a road trip, there is a gas station at the 700-mile mark and the 800-mile mark. You have about 50 miles left in the tank when you hit the 765-mile mark, which gas station is the closest for you to go to?
 
</td></tr>
</table>

PATTERNING & ALGEBRAIC REASONING *– fluency, addition and subtraction within 10,000, multiplication and division within 100, equality, properties of operations*					
3.PAR.2: Use part-whole strategies to represent and solve real-life problems involving addition and subtraction with whole numbers within 10,000.					
Expectations		**Evidence of Student Learning** **(not all inclusive; see Grade Level Overview for more details)**			
3.PAR.2.1	Fluently add and subtract within 1000 to solve problems.	***Terminology*** ● Fluently/Fluency – To achieve fluency, students should be able to choose flexibly among methods and strategies to solve mathematical problems accurately and efficiently. ● Dot plots and line plots are similar tools with different symbols used to display the data points. They can be used interchangeably.	***Relevance and Application*** ● Students should be able to use numerical reasoning to solve mathematical problems relevant to everyday life involving all problem types. Click here for a listing of all problem types. ● Relevant problems can include word problems that are meaningful to a student's real environment. It is important for the problems presented to be relevant and interesting for the learners to pique their natural, intellectual curiosity.	***Strategies and Methods*** – *see special note in appendix* ● Strategies may be based on place value, properties of operations, and/or the relationship between addition and subtraction. ● Some problems should include data obtained from measurements of objects. This will allow students to apply their problem-solving abilities to reading bar graphs, pictographs, and dot plots as they solve problems within 1000.	***Age/Developmentally Appropriate*** ● Students should be allowed to choose an appropriate strategy to demonstrate fluency. ● Finding and using key words is not an appropriate strategy.
3.PAR.2.2	Apply part-whole strategies, properties of operations and place value understanding, to solve problems involving addition and subtraction within 10,000. Represent these problems using equations with a letter standing for the unknown quantity. Justify solutions.	***Fundamentals*** ● Students should add and subtract multi-digit whole numbers within 10,000 to solve authentic, mathematical problems using efficient and generalizable procedures, based on knowledge of place value and properties of operations. ● The focus of this learning objective is mathematical reasoning and sense-making.		***Strategies and Methods*** – *see special note in appendix* ● Students should be given opportunities to use variety of models and representations when extending their understanding of part-whole reasoning strategies. ● Students should be given the choice of which strategy they can use.	

3.PAR.3: Use part-whole strategies to solve real-life, mathematical problems involving multiplication and division with whole numbers within 100.				
Expectations		**Evidence of Student Learning** **(not all inclusive; see Grade Level Overview for more details)**		
3.PAR.3.1	Describe, extend, and create numeric patterns related to multiplication. Make predictions related to the patterns.	***Age/Developmentally Appropriate*** ● Identifying patterns can help students derive and automatize multiplication facts. ● Multiplication tables may be used to help students discover patterns and relationships. ● A student looking at a multiplication table may discover that multiples of even numbers (2, 4, 6, and 8) are always even; the products in each row and column increase by the same amount (skip counting); the multiples of 6 are double the multiples of 3; the multiples of any number fall on a horizontal and a vertical line due to the commutative property, etc. ● Patterns may include exposure to even and odd extending from previous work in 2nd grade.		***Example*** ● A student highlighting the multiples of 9 on a hundreds chart might notice 2 x 9 is 2 away from 20, 3 x 9 is 3 away from 30, and so forth.
3.PAR.3.2	Represent single digit multiplication and division facts using a variety of strategies. Explain the relationship between multiplication and division.	***Fundamentals*** ● Students should solve multiplication problems including single-digit factors and division problems including single-digit divisors and quotients.	***Strategies and Methods*** – *see special note in appendix* ● Multiplication strategies may include repeated addition, equal-sized groups, arrays, area models, equal jumps on a number line and skip counting. ● Multiplication tables may be used to help students discover patterns and relationships. ● Division strategies may include repeated subtraction, equal sharing, and forming equal groups. ● Examples of different strategies and representations can be found within the *Computational Strategies for Whole Numbers* document found in the appendices.	***Age/Developmentally Appropriate*** ● Students should be able to use numerical reasoning to learn multiplication and division facts through playing games and solving authentic, mathematical problems. ● Fluency does not lend itself to timed tests or speed. Students should be given opportunities to choose flexibly among methods and strategies to solve mathematical problems accurately and efficiently. ● Fluency can be assessed in different ways.
3.PAR.3.3	Apply properties of operations (i.e., commutative property, associative property, distributive property) to multiply and divide within 100.	***Age/Developmentally Appropriate*** ● These properties should be used organically within the daily number sense routines. ● Students at this grade level are not expected to identify the specific properties. ● Third grade students do not need to know the formal names for these properties.		***Examples*** ● 7 x 3 is known, then 3 x 7 is also known (Commutative Property) ● 3 x 5 x 2 can be found by 3 x 5 = 15, then 15 x 2 = 30, or 5 x 2 = 10, then 3 x 10 = 30 (Associative Property) ● Knowing 8 x 5 = 40 and 8 x 2 = 16, 8 x 7 can be found as the sum of these partial products: 8 x (5 + 2) = (8 x 5) + (8 x 2) = 40 + 16 = 56 (Distributive Property)
3.PAR.3.4	Use the meaning of the equal sign to determine whether expressions involving	***Age/Developmentally Appropriate*** ● Students build upon their prior knowledge of equality to extend to relational understanding.	***Examples*** ● Ten teams of 8 students signed up for a volleyball tournament. One of the teams had to drop out. Write an equation with two expressions that show how many students will be at the tournament.	

	addition, subtraction, and multiplication are equivalent.			○ Possible solutions: 9 groups of 8 is the same as 10 groups of 8 minus one group of 8 or 9 x 8 = (10 x 8) – 8, or 9 x 8 = 8 + 8 + 8 + 8 + 8 + 8 + 8 + 8 + 8 ○ Students may also use picture drawings or models to justify their thinking.	
3.PAR.3.5	Use place value reasoning and properties of operations to multiply one-digit whole numbers by multiples of 10, in the range 10-90.	***Age/Developmentally Appropriate*** ● Students should be given an opportunity to explore that when a number is 10 times larger than another number, this does not come from adding zero. ● Students should understand that adding zero does not change the overall quantity. ● Students should explore the patterns of multiplying by ten and notice how the magnitude of the number changes. Exploring the pattern, students should uncover as numbers are multiplied by a multiple of 10, the digit shifts left, making the value ten times more with each shift.			***Example*** ● 6 times 20 is 120 because 6 groups of 20 is 120; or 6 x 20 = 6 x (10 x 2) = (6 x 10) x 2 = 60 x 2 = 120.
3.PAR.3.6	Solve practical, relevant problems involving multiplication and division within 100 using part-whole strategies, visual representations, and/or concrete models.	***Fundamentals*** ● Students should be able to solve practical, realistic division problems including "how many in each group" and "how many groups" using efficient and flexible strategies.	***Age/Developmentally Appropriate*** ● Multiplication and division within 100 means multiplication and division of two whole numbers with whole number answers, and with product or dividend in the range 0-100 (e.g., 39 ÷ 3 = 13).	***Relevance and Application*** ● Relevant problems can include word problems that are meaningful to a student's real environment. It is important for the problems presented to be relevant and interesting for the learners to pique their natural, intellectual curiosity.	***Strategies and Methods*** – *see special note in appendix* ● Some problems should include creating and reading bar graphs, pictographs, and dot plots. Data could include values obtained from measurements of objects.	***Example*** ● The store had video games on sale for $15 each. If you bought 4 games, how much would you spend?
3.PAR.3.7	Use multiplication and division to solve problems involving whole numbers to 100. Represent these problems using equations with a letter standing for the unknown quantity. Justify solutions.	***Fundamentals*** ● Students should use a variety of strategies to solve multi-step authentic, mathematical problems. ● Students should represent problems using equations with a variable standing for the unknown quantity and justify their answers. Variables can be letters used to represent the unknown. ● Students should use numerical reasoning to assess the reasonableness of answers.	***Age/Developmentally Appropriate*** ● This is limited to problems posed with whole numbers and having whole-number answers. Situations involving money should not include decimal numbers.	***Strategies and Methods*** – *see special note in appendix* ● Some problems should include creating and reading bar graphs, pictographs, and dot plots. ● Data could include values obtained from measurements of objects.		***Example*** ● At the movies, tickets cost $11 each, popcorn costs $7 each, and drinks costs $4 each. If I have $35, do I have enough to purchase 2 tickets, 1 popcorn, and 2 drinks?

NUMERICAL REASONING *– unit fractions, equivalent fractions, fractions greater than 1*				
3.NR.4: Represent fractions with denominators of 2, 3, 4, 6 and 8 in multiple ways within a framework using visual models.				
Expectations		**Evidence of Student Learning** (not all inclusive; see Grade Level Overview for more details)		
3.NR.4.1	Describe a unit fraction and explain how multiple copies of a unit fraction form a non-unit fraction. Use parts of a whole, parts of a set, points on a number line, distances on a number line and area models.	***Age/Developmentally Appropriate*** ● This standard is limited to fractions with denominators of 2, 3, 4, 6 and 8. ● Set sizes should not exceed 24.	***Strategies and Methods*** ● Students should investigate unit fractions using area models, parts of a set, linear models, and points on a number line. ● Students should be given the opportunity to explore this concept using a variety of visual tools such as Cuisenaire rods, fraction tiles, fraction strips, fraction bars, fraction towers, number lines, etc.	***Example*** ● Understand that $\frac{3}{4}$ is composed of three pieces, each with a size of $\frac{1}{4}$. 
3.NR.4.2	Compare two unit fractions by flexibly using a variety of tools and strategies.	***Fundamentals*** ● Students should be able to recognize that comparisons are valid only when the two fractions refer to the same whole.	***Strategies and Methods*** ● Students should be able to use numerical reasoning strategies when comparing unit fractions. ● Tools and strategies could include visual fraction models. ● Students should record the results of comparisons with symbols >, =, or <, and justify the conclusions.	
3.NR.4.3	Represent fractions, including fractions greater than one, in multiple ways.	***Age/Developmentally Appropriate*** ● This standard is limited to fractions with denominators of 2, 3, 4, 6 and 8. ● Set sizes should not exceed 24.	***Strategies and Methods*** ● Students should investigate unit fractions using area models, set models (parts of a set), linear models, and points representing distances on a number line. ● Students should be given the opportunity to explore this concept using a variety of visual tools such as Cuisenaire rods, fraction tiles, fraction strips, fraction bars, fraction towers, number lines, analog clock, fraction circle, etc.	***Example*** ● There are 6 keys in Stephanie's collection. She gives two of them to her friend. What fraction of her collection did she give? Possible Solution:  She gave 1/3 of her collection.
3.NR.4.4	Recognize and generate simple equivalent fractions.	***Fundamentals*** ● Students should explore the relationship between halves, fourths, and eighths, as well as thirds and sixths to generate simple equivalent fractions.	***Age/Developmentally Appropriate*** ● This standard is limited to fractions with denominators of 2, 3, 4, 6 and 8.	***Strategies and Methods*** ● Students should determine that two fractions are equal when they are the same size or on the same location on a number line. ● Students should express whole numbers as fractions recognize fractions that are equivalent to whole numbers.

MEASUREMENT & DATA REASONING *– elapsed time, liquid volume, mass, lengths in half and fourth of an inch, data*					
3.MDR.5: Solve real-life, mathematical problems involving length, liquid volume, mass, and time.					
Expectations		**Evidence of Student Learning** **(not all inclusive; see Grade Level Overview for more details)**			
3.MDR.5.1	Ask questions and answer them based on gathered information, observations, and appropriate graphical displays to solve problems relevant to everyday life.	***Fundamentals*** ● Relevant problems can include word problems that are meaningful to a student's real environment. It is important for the problems presented to be relevant and interesting for the learners to pique their natural, intellectual curiosity. ● Questions should be student generated.			
3.MDR.5.2	Tell and write time to the nearest minute and estimate time to the nearest fifteen minutes (quarter hour) from the analysis of an analog clock.	***Fundamentals*** ● Students should be given opportunities to determine relative time and predict time to the nearest fifteen minutes using only the hour hand of an analog clock.			
3.MDR.5.3	Solve meaningful problems involving elapsed time, including intervals of time to the hour, half hour, and quarter hour where the times presented are only on the hour, half hour, or quarter hour within a.m. or p.m. only.	***Age/Developmentally Appropriate*** ● Problems should include am/pm, start unknown, end unknown, and change unknown and addition/subtraction of time intervals. ● Students should be given opportunities to use number lines to find unknowns. ● Relevant problems can include word problems that are meaningful to a student's real environment. It is important for the problems presented to be relevant and interesting for the learners to pique their natural, intellectual curiosity.		***Examples*** ● The bus comes at 7:00 a.m. It takes me 15 minutes to eat breakfast and 30 minutes to get ready. What time do I need to wake up? (e.g., start unknown) ● I went to the movies at 3:15 p.m. The movie lasted 1 hour 45 minutes. What time did the movie end? (e.g., end unknown) ● After school I went to the park at 2:30 p.m. and left to go home at 3:45 p.m. How long was I at the park? (e.g., change unknown)	
3.MDR.5.4	Use rulers to measure lengths in halves and fourths (quarters) of an inch and a whole inch.	***Age/Developmentally Appropriate*** ● Students should use rulers marked with halves and fourths (quarters) of an inch. ● Students must have prior knowledge of fractions on a number line.			
3.MDR.5.5	Estimate and measure liquid volumes, lengths and masses of objects using customary units. Solve problems involving mass, length, and volume given in the same unit, and reason about the relative sizes of measurement units within the customary system.	***Fundamentals*** ● Students should have an opportunity to compare capacity by filling one container with something and then pouring this amount into the comparison container. ● Students should have opportunities to physically measure objects.	***Age/Developmentally Appropriate*** ● Conversions are not expected in this grade level. The focus here should be on helping learners see the equivalence between quantities. ● Students extend understanding of measuring length in inches to measuring in feet and yards.	***Terminology*** ● The terminology below is used to clarify expectations for the teaching professional. Students are not required to use this terminology when engaging with the learning objective. ○ Customary measurement units include weight (oz., lbs., tons) capacity (fl. oz, cups, pints, quarts, gallons), length (in., ft., yds., miles).	***Example*** ● Students should be able to record measurement equivalents in a two-column table.

GEOMETRIC & SPATIAL REASONING *– polygons, parallel line segments, perpendicular line segments, right angles, lines of symmetry, area, perimeter*

3.GSR.6: Identify the attributes of polygons, including parallel segments, perpendicular segments, right angles, and symmetry.

Expectations		Evidence of Student Learning (not all inclusive; see Grade Level Overview for more details)			
3.GSR.6.1	Identify perpendicular line segments, parallel line segments, and right angles, identify these in polygons, and solve problems involving parallel line segments, perpendicular line segments, and right angles.	***Terminology*** ● Two lines are perpendicular if the angle formed at their intersection is a right angle (angles that form a square corner). ● Two lines are parallel if they are in the same plane and never intersect.	***Age/Developmentally Appropriate*** ● There should be a focus on the investigation of quadrilaterals, specifically, but other polygons should also be explored.	***Example*** ● Given a variety of shapes, identify whether each includes parallel line segments, perpendicular line segments, and right angles.	
3.GSR.6.2	Classify, compare, and contrast polygons, with a focus on quadrilaterals, based on properties. Analyze specific 3-dimensional figures to identify and describe quadrilaterals as faces of these figures.	***Fundamentals*** ● Students should explore, compare, and contrast polygons based on properties. ● There should be a focus on the investigation of quadrilaterals, specifically, but other polygons should also be explored. ● Students should also be able to identify and name precise quadrilaterals as faces of specific 3-dimensional figures.	***Age/Developmentally Appropriate*** ● This learning objective does not require students to create a hierarchy.	***Strategies and Methods*** ● Quadrilaterals should include square, rectangle, rhombus, parallelogram, trapezoid, and kite.	***Terminology*** ● Properties may include angles, side lengths, symmetry, congruence, and the presence or absence of parallel or perpendicular lines. ● Students should be able to identify types of angles, including acute, obtuse, and right. ○ Right angle – An angle with a square corner. ○ Acute angle – An angle smaller than a right angle. ○ Obtuse angle – An angle larger than a right angle. ● In Georgia resources and assessments, the inclusive definitions for the classification of shapes are used. Therefore, trapezoids are defined using the inclusive definition: at least one pair of parallel sides.
3.GSR.6.3	Identify lines of symmetry in polygons.	***Fundamentals*** ● There should be a focus on the investigation of quadrilaterals, specifically, but other polygons should also be explored.	***Age/Developmentally Appropriate*** ● Students should investigate symmetry using a variety of materials, such as miras and paper folding.	***Terminology*** ● Quadrilaterals are polygons with four sides and four angles.	

3.GSR.7: Identify area as a measurable attribute of rectangles and determine the area of a rectangle presented in real-life, mathematical problems.

Expectations		Evidence of Student Learning (not all inclusive; see Grade Level Overview for more details)		
3.GSR.7.1	Investigate area by covering the space of rectangles presented in realistic situations using multiple copies of the same unit, with no	***Age/Developmentally Appropriate*** ● The expectation at this grade level is for students to explore areas of rectangles only.	***Strategies and Methods*** ● Students should use numerical and spatial reasoning to determine the area of rectangles presented in realistic, mathematical problems.	***Example*** ● Students can determine the area of the top of their desk or other rectangle outlined by tape on the desk by covering it using non-standard units,

	gaps or overlaps, and determine the total area (total number of units that covered the space).			such as index cards, sticky notes, tiles, etc.
3.GSR.7.2	Determine the area of rectangles (or shapes composed of rectangles) presented in relevant problems by tiling and counting.	***Age/Developmentally Appropriate*** ● The expectation at this grade level is for students to explore areas of rectangles by tiling and counting to develop the concept of area as the space (number of tiles) needed to cover the shape.	***Strategies and Methods*** ● Students should use numerical and spatial reasoning to determine the area of rectangles presented in realistic, mathematical problems by counting or tiling. ● Relevant problems can include word problems that are meaningful to a student's real environment. It is important for the problems presented to be relevant and interesting for the learners to pique their natural, intellectual curiosity.	***Example*** ● A laptop cover is being made with square vinyl stickers. There are four rows of stickers. There are 9 stickers in each row. How many square stickers were used to create the laptop cover?

3.GSR.7.3	Discover and explain how area can be found by multiplying the dimensions of a rectangle.	***Age/Developmentally Appropriate*** ● Dimensions of the rectangle could be limited to values up to 10 for each dimension. Students could explore higher values for dimensions as they show readiness.	***Fundamentals*** ● Students should have multiple opportunities to connect area to the investigations of multiplication using arrays.	***Terminology*** ● The dimensions of a rectangle can be referred to as length and width OR base and height. ● A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area (e.g., square cm, square m, square in, square ft).	***Example*** ● The area of a rectangle with whole-number side lengths a and b + c is the sum of a × b and a × c; 4 x 7 is the same as 4 x (2 + 5) and is the sum of 4 x 2 and 4 x 5. ● In a rectangular garden, you have four rows of peanut plants. There are 9 peanut plants in each row. How many peanut plants are there in the garden?

3.GSR.8: Determine the perimeter of a polygon presented in real-life, mathematical problems.

Expectations		**Evidence of Student Learning** **(not all inclusive; see Grade Level Overview for more details)**			
3.GSR.8.1	Determine the perimeter of a polygon and explain that the perimeter represents the distance around a polygon. Solve problems involving perimeters of polygons.	***Age/Developmentally Appropriate*** ● At this grade level, students should explore perimeters of polygons with up to ten sides.	***Fundamentals*** ● Students should be given opportunities to develop a conceptual understanding of perimeter of all types of polygons including regular and irregular. ● Students should investigate perimeters of polygons with a focus on quadrilaterals. ● Students should be able to find the perimeter given the side lengths.	***Terminology*** ● The focus of this learning objective should be on developing the conceptual understanding of perimeter, rather than on terminology. ● A polygon is a closed figure with at least three straight sides and angles; a polygon is regular only when all sides are equal and all	***Examples*** ● Your neighbor has 24 feet of fencing and wants you to help her build a rectangular pen for her dog. What are some possible dimensions for the dog pen? Which pen would you recommend and why? ● A square pizza box has a perimeter of 32 inches, what are side lengths of the box? ● If a stop sign has a side length of 4 inches, what would be its perimeter?

			● Students should be able to find the unknown side length given the perimeter.	angles are equal; and a polygon is irregular when all sides are not equal or all angles are not equal.	
3.GSR.8.2	Investigate and describe how rectangles with the same perimeter can have different areas or how rectangles with the same area can have different perimeters.	***Age/Developmentally Appropriate*** ● This learning objective is limited to rectangles only.	***Relevance and Application*** ● Students should solve authentic, mathematical problems involving perimeter and area of rectangles.	***Example*** ● I have eighteen 1-foot panels to build a raised garden bed. How many different ways can I put these eighteen panels together to build a rectangular raised garden bed? Which rectangle will have the greatest area?	

ESSENTIAL INSTRUCTIONAL GUIDANCE

MATHEMATICAL PRACTICES

The Mathematical Practices describe the reasoning behaviors students should develop as they build an understanding of mathematics – the "habits of mind" that help students become mathematical thinkers. There are eight standards, which apply to all grade levels and conceptual categories.

These mathematical practices describe how students should engage with the mathematics content for their grade level. Developing these habits of mind builds students' capacity to become mathematical thinkers. These practices can be applied individually or together in mathematics lessons, and no particular order is required. In well-designed lessons, there are often two or more Mathematical Practices present.

MATHEMATICAL PRACTICES	
MP: Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals.	
Code	**Expectation**
MP.1	Make sense of problems and persevere in solving them.
MP.2	Reason abstractly and quantitatively.
MP.3	Construct viable arguments and critique the reasoning of others.
MP.4	Model with mathematics.
MP.5	Use appropriate tools strategically.
MP.6	Attend to precision.
MP.7	Look for and make use of structure.
MP.8	Look for and express regularity in repeated reasoning.

MATHEMATICAL MODELING

Teaching students to model with mathematics is engaging, builds confidence and competence, and gives students the opportunity to collaborate and make sense of the world around them, the main reason for doing mathematics. For these reasons, mathematical modeling should be incorporated at every level of a student's education. This is important not only to develop a deep understanding of mathematics itself, but more importantly to give students the tools they need to make sense of the world around them. Students who engage in mathematical modeling will not only be prepared for their chosen career but will also learn to make informed daily life decisions based on data and the models they create.

The diagram below is a mathematical modeling framework depicting a cycle of how students can engage in mathematical modeling when solving a realistic problem or task.

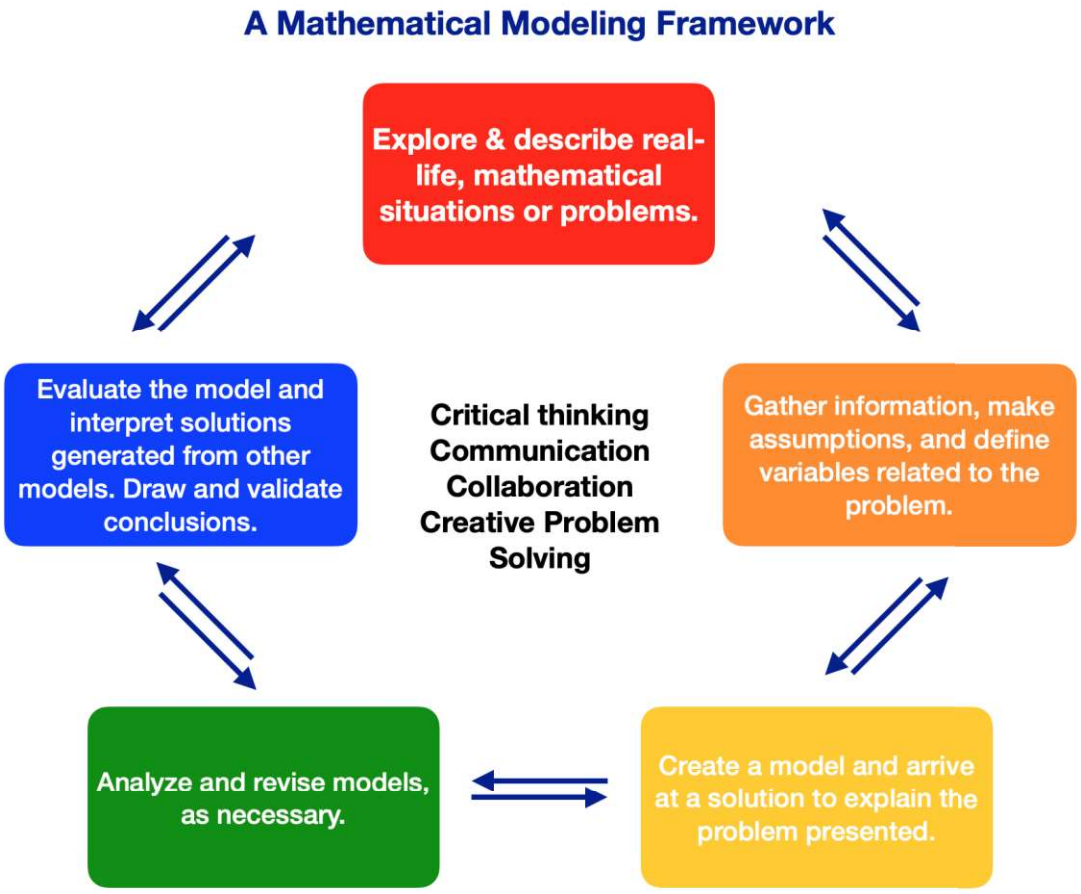


Image adapted from: Suh, Matson, Seshaiyer, 2017

FRAMEWORK FOR STATISTICAL REASONING

Statistical reasoning is important for learners to engage as citizens and professionals in a world that continues to change and evolve. Humans are naturally curious beings and statistics is a language that can be used to better answer questions about personal choices and/or make sense of naturally occurring phenomena. Statistics is a way to ask questions, explore, and make sense of the world around us.

The Framework for Statistical Reasoning should be used in all grade levels and courses to guide learners through the sense-making process, ultimately leading to the goal of statistical literacy in all grade levels and courses. Reasoning with statistics provides a context that necessitates the learning and application of a variety of mathematical concepts.

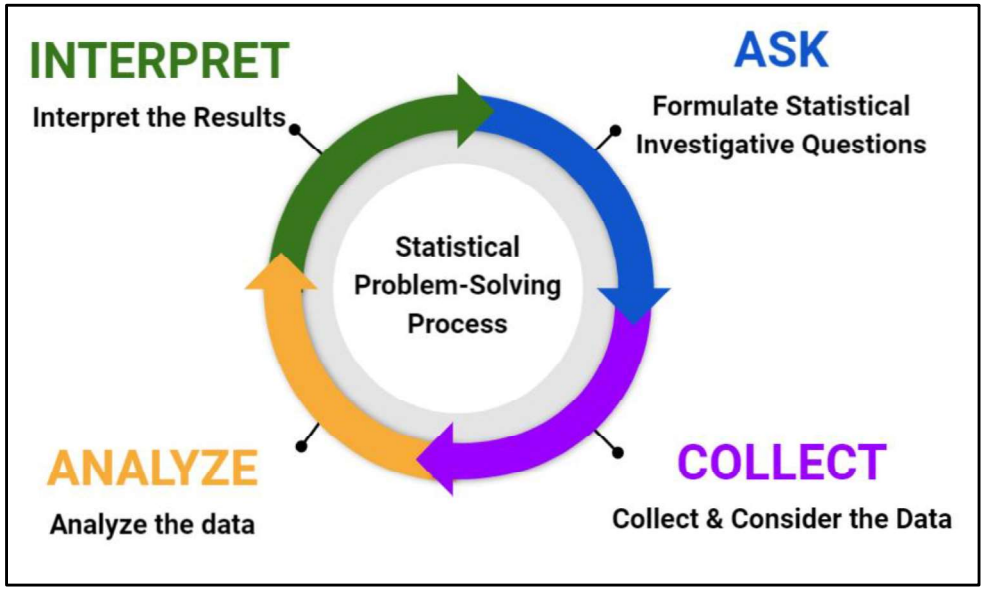


FIGURE 1: GEORGIA FRAMEWORK FOR STATISTICAL REASONING

The following four-step statistical problem-solving process can be used throughout each grade level and course to help learners develop a solid foundation in statistical reasoning and literacy:

I. Formulate Statistical Investigative Questions
Ask questions that anticipate variability.

II. Collect & Consider the Data
Ensure that data collection designs acknowledge variability.

III. Analyze the Data
Make sense of data and communicate what the data mean using pictures (graphs) and words. Give an accounting of variability, as appropriate.

IV. Interpret the Results
Answer statistical investigative questions based on the collected data.

2nd Grade: Create statistical investigative questions that can be answered using data. Collect, analyze, and interpret categorical data presented as picture graphs and bar graphs (with single-unit scales) with **up to four categories** from real situations to answer questions.

Ask	Collect	Analyze	Interpret
Create a statistical investigative question that can be answered by gathering, representing, and interpreting data.	**Determine strategies for collecting and organizing data to answer a statistical investigative question.**	**Create a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Analyze the information by asking and answering questions about the data.**	**Interpret categorical data to answer the statistical investigative question created.**

Instructional Supports

- Expectations in this grade level should be taught throughout the year and applied contextually to the current expectation and real events.
- Students should formulate a statistical investigative question to explore an authentic situation in their classroom.
- The data collection can occur through the use of surveys and scientific observations. Tables and tally marks can be used to organize data.
- Pictographs and bar graphs used at this grade level should represent a data set with no more than four categories.
- Students should solve simple join, separate, and compare problems using information presented.
- Students should use addition and subtraction to create and obtain information from tables, pictographs, bar graphs, and tally charts.

3rd Grade: Create statistical investigative questions that can be answered using data. Collect, analyze, and interpret numerical and categorical data involving **whole number values** obtained from real situations to answer questions.

Ask	Collect	Analyze	Interpret
Create a statistical investigative question that can be answered using data from authentic situations.	**Determine strategies for collecting and organizing numerical data and categorical data involving whole number values to answer a statistical investigative question.**	**Create pictographs, bar graphs, and dot plots with a variety of scales, using appropriate titles, labels, and units within the graphical display.**	**Interpret categorical and numerical data to answer the statistical investigative question created.**

Instructional Supports

- Expectations in this grade level should be taught throughout the year and applied contextually to the current expectation and actual life events.
- In previous grade levels, students analyzed categorical data. In third grade, this is extended to include numerical data analysis.
- Students should formulate a statistical investigative question to explore a real situation in their classroom.
- Students should be provided with learning experiences to collect and analyze both numerical data and categorical data.
- Some problems should include reading bar graphs, pictographs, and dot plots, as well as customary measurements. Dot plots and line plots can be used interchangeably. Dot plots should be used for numerical data representation on a number line.
- Developing strategies for collecting data include students collaborating to determine ways to collect data. Data can be gathered from a variety of sources to answer the statistical investigative question posed. Data sets for categorical data may include several categories.
- The scales of the pictographs, bar graphs, and dot plots should depend on the data collected. On a pictograph, one symbol may stand for a value greater than 1 to allow students to apply their understanding of single digit multiplication and division facts.
- Students should use a ruler that is marked at halves and fourths only to create an evenly spaced number line for the dot plot.
- *Numerical data* - data that can be expressed in numbers rather than natural language. An example of numerical data that could be collected is the number of people who attended the movie theater over the course of a month.
- *Categorical data* - a type of data used to group information with similar characteristics. Examples of categorical data that could be collected might be marital status, favorite sport, or favorite type of movie.

COMPUTATIONAL STRATEGIES FOR WHOLE NUMBERS

Mathematics Place-Value Strategies and US Traditional Algorithms

Specific mathematics strategies for teaching and learning are not mandated by the Georgia Department of Education or assessed on state or federally mandated tests. Students may solve problems in different ways and have the flexibility to choose a mathematical strategy that allows them to make sense of and strategically solve problems using efficient methods that are most comfortable for and makes sense to them. It is critical that teachers and parents remain partners to help each child grow to become a mathematically literate citizen. These standards preserve and affirm local control and flexibility.

In mathematics, the emphasis is on the reasoning and thinking about the quantities within mathematical contexts. Algorithms, tape diagrams (bar models), and number line representations are a few examples of ways that students communicate their strategic thinking in a written form.

Addition Example: 1573 + 796

US Traditional Algorithm:

$$\begin{array}{r} {\scriptstyle 1\ \ 1\ \ \ \ } \\ 1\ 5\ 7\ 3 \\ +\ \ 7\ 9\ 6 \\ \hline 2\ 3\ 6\ 9 \end{array}$$

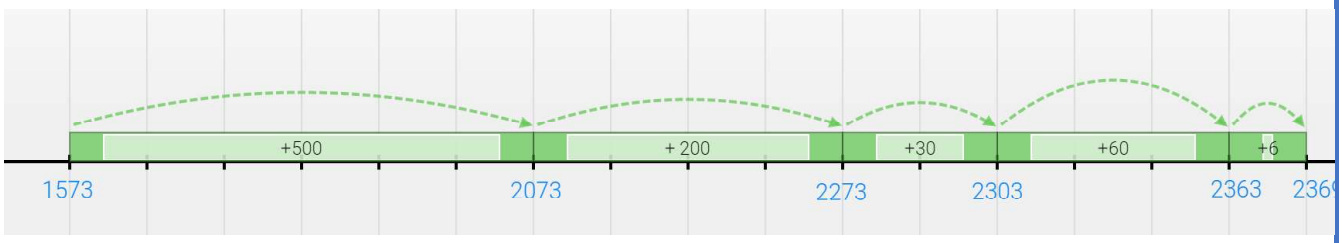
Description:

As students make sense of and use addition strategies and algorithms, it is important for them to be given the flexibility to use a part-whole strategy such as place value partitioning, adding on in parts, estimation and compensation, and friendly numbers to communicate their thinking using a written recording of that strategy that is most comfortable for and makes sense to them. Students should be able to demonstrate a deep understanding of the relationship between the quantities presented in the mathematics number sentence and to attend to precision in their explanations. Flexibility in thinking is key!

Place Value Algorithm:

$$\begin{array}{rrrr} 1 & 5 & 7 & 3 \\ + & 7 & 9 & 6 \\ \hline & & & 9 \\ + & 1 & 6 & 0 \\ + & 1 & 2 & 0 & 0 \\ + & 1 & 0 & 0 & 0 \\ \hline 2 & 3 & 6 & 9 \end{array}$$

Number Line Representation:



It is important to note that the examples of strategies provided in the tables are not all inclusive. Students may solve problems in different ways and have the flexibility to choose a mathematical strategy that allows them to make sense of and strategically solve problems using efficient methods that are most comfortable for and makes sense to them.

Subtraction Example: 2145 - 178

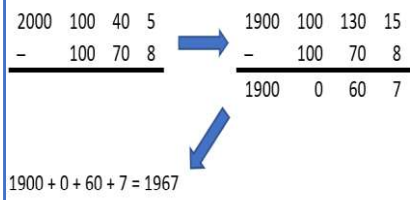
US Traditional Algorithm:

$$\begin{array}{r} {\scriptstyle 0\ \ 13\ \ 15} \\ 2\ \ \not{1}\ \ \not{4}\ \ \not{5} \\ -\quad 1\ \ 7\ \ 8 \\ \hline 1\ \ 9\ \ 6\ \ 7 \end{array}$$

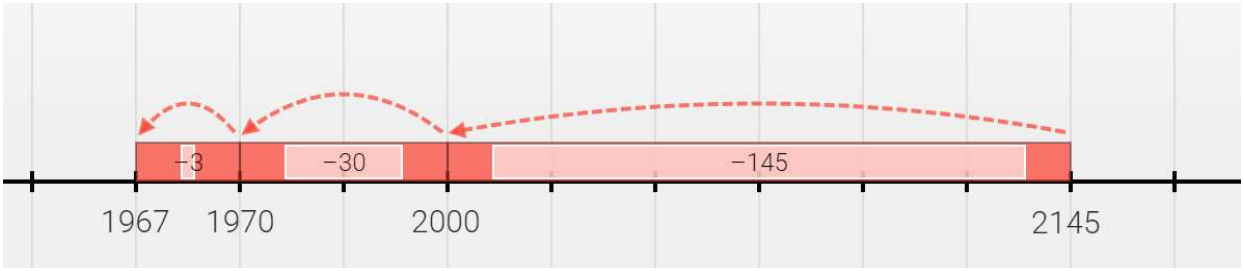
Description:

As students make sense of and use subtraction strategies and algorithms, it is important for them to be given the flexibility to use a part-whole strategy such as place value partitioning, adding up, counting back in chunks, and same difference and communicate their thinking using a written recording of that strategy that is most comfortable for and makes sense to them. Students should be able to demonstrate a deep understanding of the relationship between the quantities presented in the mathematics number sentence and to attend to precision in their explanations. Flexibility in thinking is key!

Place Value Algorithm:



Number Line Representation:



It is important to note that the examples of strategies provided in the tables are not all inclusive. Students may solve problems in different ways and have the flexibility to choose a mathematical strategy that allows them to make sense of and strategically solve problems using efficient methods that are most comfortable for and makes sense to them.

Multiplication Example: 25 x 24

US Traditional Algorithm:

$$\begin{array}{r} {\scriptstyle 1\ \ 2}\ 25 \\ \times\ 24 \\ \hline 100 \\ +\ 500 \\ \hline 600 \end{array}$$

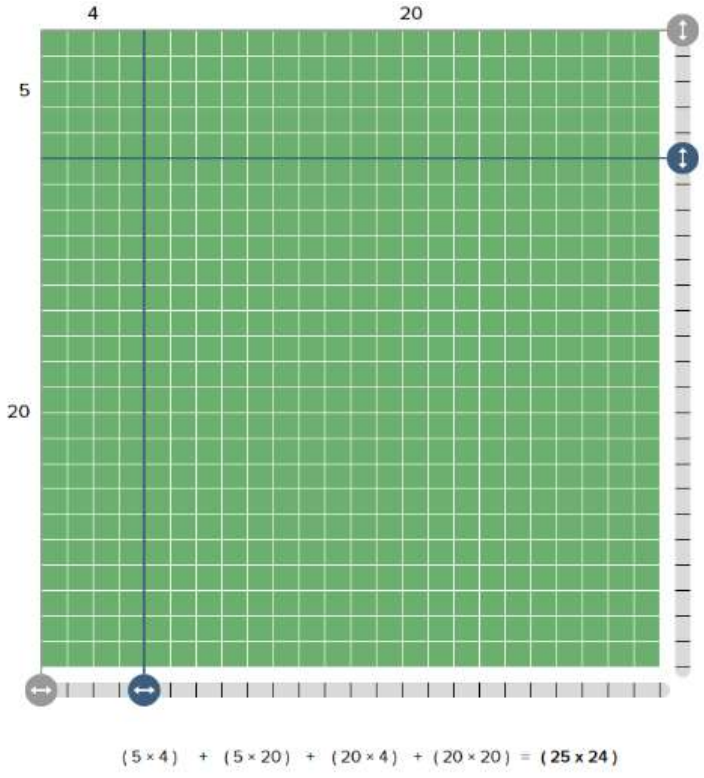
Description:

As students make sense of and use multiplication strategies and algorithms, it is important for them to demonstrate a deep understanding of the relationship between the quantities presented in the mathematics number sentence and to attend to precision in their explanations. Students are encouraged to use strategies such as partial products, friendly numbers, and a combination of known facts to determine solutions to new problems. It is also important for students to maintain the ability to choose which part-whole strategy is best to communicate their mathematical thinking. Flexibility in thinking is key!

Place Value Algorithm:

$$\begin{array}{rrl} & 25 & \\ \times & 24 & \\ \hline & 400 & (20 \times 20) \\ + & 100 & (20 \times 5) \\ + & 80 & (4 \times 20) \\ + & 20 & (4 \times 5) \\ \hline & 600 & \end{array}$$

Area Representation (Partial Products):



It is important to note that the examples of strategies provided in the tables are not all inclusive. Students may solve problems in different ways and have the flexibility to choose a mathematical strategy that allows them to make sense of and strategically solve problems using efficient methods that are most comfortable for and makes sense to them.